CLAIMS

1. A gas treatment device, comprising:

a substrate;

a shell concentrically disposed around said substrate;

a mat support material disposed between said substrate and said shell; and

a variable flow regulator assembly in fluid communication with said substrate, said variable flow regulator assembly comprising a second portion having a coefficient of thermal expansion greater than a first portion coefficient of thermal expansion, and wherein said second portion is disposed between a first portion and said substrate.

2. The gas treatment device recited in Claim 1, wherein at least a section of said first portion is concentrically disposed around at least a section of said second portion.

3. The gas treatment device recited in Claim 2, wherein said first portion is fixedly attached to said second portion with an attachment selected from the group consisting of a screw, bracket, pin, punch, crimp, weld, adhesive, bonding agent, joint, and combinations comprising at least one of the foregoing attachments.

4. The gas treatment device recited in Claim 3, wherein said attachment is disposed at a location opposite said substrate, wherein said location is selected from the group consisting of a first portion end, a second portion end, proximate said first portion end, proximate said second portion end, and a combination thereof.

5. The gas treatment device recited in Claim 4, wherein said bonding agent adheres to at least a section of an interior surface of said first portion and at least a section of an exterior surface of said second portion.

6. The gas treatment device recited in Claim 1, further comprising an exhaust system component disposed in operable communication with said shell, wherein said exhaust system component is selected from the group consisting of an end cone, end plate, pipe, coupling apparatus, exhaust manifold cover, exhaust manifold apparatus, and combinations comprising at least one of the foregoing exhaust system components.

7. The gas treatment device recited in Claim 6, wherein said said exhaust system component is disposed around at least a section of said variable flow regulator assembly.

8. The gas treatment device recited in Claim 7, wherein at least a section of said first portion is concentrically disposed around at least a section of said second portion.

9. The gas treatment device recited in Claim 6, wherein said variable flow regulator assembly comprises a length sufficient to span up to about 99% of a distance between said exhaust system component and said substrate.

10. The gas treatment device recited in Claim 9, wherein said length is greater than or equal to about 85% of said distance.

11. The gas treatment device recited in Claim 6, wherein about 5% to about 15% of a length of said variable flow regulator assembly is fixedly attached to an exhaust system component inlet at an end of said variable flow regulator assembly opposite said substrate.

12. The gas treatment device recited in Claim 1, wherein said first portion and said second portion comprise equal lengths.

13. The gas treatment device recited in Claim 1, wherein said first portion and said second portion comprise different lengths.

14. The gas treatment device recited in Claim 1, wherein said substrate further comprises a catalyst.

15. The gas treatment device recited in Claim 1, wherein said gas treatment device is selected from the group consisting of catalytic converters, evaporative emissions treatment devices, hydrocarbon scrubbing devices, photocatalytic treatment device, diesel particulate traps, and non-thermal plasma reactors.

16. The gas treatment device recited in Claim 1, wherein at least one of said first portion and said second portion further comprise a plurality of concentrically aligned segments.

17. A method for using a gas treatment device, comprising:

introducing a gas into said gas treatment device comprising a shell concentrically disposed around a substrate, a mat support material disposed between said substrate and said shell, and a variable flow regulator assembly in fluid communication with said substrate, said variable flow regulator assembly comprising a second portion having a coefficient of thermal expansion greater than a first portion coefficient of thermal expansion, and wherein said second portion is disposed between a first portion and said substrate;

passing said gas through said variable flow regulator assembly; and

changing a flow distribution of said gas to said substrate.

18. The method recited in Claim 17, further comprising increasing an internal diameter of at least an end of said variable flow regulator assembly disposed adjacent said substrate.

19. The method recited in Claim 18, wherein said increasing said internal diameter creates spaces between a plurality of segments which form said conduit portions.

20. The method recited in Claim 17, wherein said changing said flow distribution further comprises conforming a shape of said variable flow regulator assembly to an interior shape of an exhaust system component disposed in fluid communication with said shell.

21. The method recited in Claim 17, wherein said changing said flow distribution further comprises changing a shape of said variable flow regulator assembly from a substantially cylindrical shape to a substantially conical shape having one or more of said conduit portions diverging away from said substrate of the gas treatment device.

22. A gas treatment device, comprising:

means for containing a substrate, with a means for supporting said substrate disposed between said substrate and said means for containing;

means for controlling fluid flow distribution to said substrate comprising a variable flow regulator assembly comprising a second portion having a coefficient of thermal expansion greater than a first portion coefficient of thermal expansion, wherein said second portion is disposed between a first portion and said substrate; and

means for connecting said means for containing to a fluid supply, wherein said means for connecting is in operable communication with said means for controlling fluid flow distribution.

23. The gas treatment device recited in Claim 22, wherein said first portion is fixedly attached to said second portion at a location opposite said substrate, wherein said attachment is selected from the group consisting of a screw, bracket, pin, punch, crimp, weld, adhesive, bonding agent, joint, and combinations comprising at least one of the foregoing attachments, and wherein said location is selected from the group consisting of a first portion end, a second portion end, proximate said first portion end, proximate said second portion end, and a combination thereof.

24. The gas treatment device recited in Claim 22, wherein said substrate further comprises a catalyst.

25. The gas treatment device recited in Claim 22, wherein said gas treatment device is selected from the group consisting of catalytic converters, evaporative emissions treatment devices, hydrocarbon scrubbing devices, photocatalytic treatment device, diesel particulate traps, non-thermal plasma reactors, and combinations comprising at least one of the foregoing devices.

26. The gas treatment device recited in Claim 22, wherein said variable regulator flow assembly further comprises a means for increasing an internal diameter of at least an end of said variable regulator flow assembly.

27. The gas treatment device recited in Claim 26, wherein said means for increasing an internal diameter forms a space between a plurality of segments defining said second portion.

28. A catalytic converter, comprising:

a shell concentrically disposed around a substrate comprising a catalyst, a mat support material disposed between said substrate and said shell;

a variable flow regulator assembly placed in fluid communication with said substrate, said variable flow regulator assembly comprising a second portion having a coefficient of thermal expansion greater than a first portion coefficient of thermal expansion, wherein said second portion is disposed between a first portion and said substrate, wherein a portion of at least said first portion is disposed around and fixedly attached to at least a section of said second portion; and

an end cone disposed concentrically around said variable flow regulator assembly in operable communication with said shell, and in fluid communication with said variable flow regulator assembly.